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Donald F. Haas
Date: October 28, 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

In re the accompanying application of	
ARIE VAN ZON, ROBERT MOENE, PHILLIP E. UNGER, PETER ARNOLDY, and ERIC J. M. DE BOER	
Serial No. 10/668,934	Group Art Unit: 1764
Filed September 23, 2003	Examiner: Thuan D. Dang
PROCESS FOR MAKING A LINEAR ALPHA-OLEFIN OLIGOMER USING A HEAT EXCHANGER	October 28, 2005

COMMISSIONER FOR PATENTS
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

BRIEF ON APPEAL TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

On September 6, 2005, the Appellants filed a Notice of Appeal from the final rejection of claims 1-7 of the Primary Examiner dated June 13, 2005. Please charge the $500 fee for this brief to Shell Oil Company Deposit Account No. 19-1800.

Real Party in Interest

The Real Party in Interest in this appeal is the Assignee, Shell Oil Company.

Related Appeals and Interferences

There are no prior and pending appeals, interferences, or judicial proceedings known to the Appellants, the Appellants' legal representative, or Assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal. However, there is a related copending application which is also assigned to Shell

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Oil Company in which similar issues have been argued before the Examiner. This application is Serial No. 10/668,933, filed June 24, 2004. The patent application information retrieval system indicates that a final rejection in this case was mailed on October 19, 2005. The Applicants intend to appeal from that final rejection.

Status of Claims

Claims 1 through 16 were originally presented for examination. Pursuant to the restriction requirement of June 2, 2004, claims 8 through 16 were withdrawn and claims 1 through 7 were elected for prosecution in this application. In the March 4, 2005 Response to Final Rejection, new claim 17 was presented. Claim 17 is not presented upon appeal because the Examiner did not enter the amendment in which claim 17 was introduced. In the Response of April 7, 2005, submitted in response to the Final Rejection and the Advisory Action of March 17, 2005, claim 1 was amended to insert the phrase, "positioned in the gas phase in the reactor but" in the penultimate line of claim 1. This last amendment was submitted along with a Request for Continued Examination.

The claims which are under consideration in this appeal are claims 1 through 7, as amended in the Response of April 7, 2005 and as shown in the Appendix hereto.

Summary of Amendments

No amendments have been filed subsequent to the final rejection of June 13, 2005.

Summary of Claimed Subject Matter

The claimed invention is a process for making a linear alpha olefin oligomer in a reactor which must have both a liquid and a gas phase. The process comprises the steps of oligomerizing ethylene in the presence of a catalyst complex, which is selected from the group consisting of nickel, palladium, cobalt, titanium, zirconium, hafnium, vanadium, chromium, molybdenum, and tungsten complexes, to an alpha olefin oligomer in a reaction which involves the release of heat. The heat is removed with a heat exchanger which is not in direct contact with the liquid phase and uses at least part of the gas phase as a coolant medium (page 5, lines 3-15, of the specification). The claims as amended require that the heat exchanger be positioned in the gas phase inside the reactor (page 6, lines 7-11, of the specification). The liquid reaction medium is required in the present invention (page 5, line 5, and line 17, of the specification). Some reaction may take place in the gas phase but the primary reaction medium is a liquid reaction medium (page 8, lines 22-27, of the specification). It is important that the cooling system have its cooling element outside of the liquid reaction medium to avoid the deposit of wax and polyethylene on the heat exchanger (page 5, lines 16-20, of the specification).

Grounds of Rejection to be Reviewed on Appeal

As stated in the Final Rejection of June 13, 2005, claims 1 and 3-7 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Gibson et al. in view of Hinton et al. The Examiner concluded that it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Gibson process by moving the heat exchanger from outside to inside of the reactor since Hinton teaches that a reactor having an inside heat exchanger outperforms the same with an outside heat exchanger. Appellants hereby appeal this rejection.

Claim 2 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Gibson et al. in view of Hinton et al. and further in view of Reagan. The Examiner concluded that Reagan discloses a complex of chromium or titanium that can be used as a catalyst for oligomerizing or polymerizing ethylene and that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Gibson process by using the Reagan catalyst. Appellants hereby appeal this rejection.

Argument

The Rejection of Claims 1 and 3-7

The Examiner's rejection is based upon the incorrect premise that Gibson et al. disclose a process for the polymerization of ethylene in a reactor containing, along with ethylene and a catalyst, a liquid phase and a gas phase which is heat exchanged. This premise is incorrect.

On page 3 of the Final Rejection of June 13, 2005, the Examiner cites several sections of Gibson reference in support of the premise. The abstract of Gibson et al. contains no reference whatsoever to heat exchange and nor does any of the text following that reference up to page 12. The Examiner's reference at page 12 of the specification of Gibson et al. does describe cooling a fluidized bed by addition of cool gas (recycled gaseous monomer) at lines 16 and 17 but this is only in connection with a gas phase polymerization process (see line 10 of page 12 of Gibson et al.). Again, the reference given by the Examiner to page 13 of Gibson et al. does discuss heat exchange at lines 22-23 but only in connection with a gas phase fluidized bed process (see line 10 of page 13 of Gibson et al.).

There are only four types of reaction processes for producing ethylene polymers discussed in Gibson et al. These are described at page 9, lines 17-18, of Gibson et al. as solution phase, slurry phase, gas phase, or bulk phase. Solution phase polymerization is carried out exactly as is implied, i.e., in solution. Slurry phase polymerization is carried out exactly as is implied, i.e., in a slurry. Gas phase polymerization is carried out exactly as is implied, i.e., in gas phase. There is nothing at all in Gibson et al. which suggests or implies that any reaction takes

place in a system which has both a discrete liquid phase where most of the reaction takes place and also a discrete gas phase from which unreacted reaction components and some reaction products may be condensed.

Furthermore, the only specific description of polymerization processes given in Gibson et al. are of slurry and gas phase processes. The slurry process is described beginning at page 10, line 26 through page 12, line 7. The gas phase process description begins at page 12, line 10 of Gibson et al. On page 12, lines 8-9 of Gibson et al., there is a statement that in a bulk polymerization process, the liquid monomer is used as the polymerization medium. Thus, bulk polymerization is also an entirely liquid phase reaction.

Up to this point in Gibson et al. (up through page 12, line 9), the reference contains no description or discussion or hint of heat exchange. The only discussion of heat exchange is in the gas phase polymerization process description (beginning at page 12, line 10). Earlier in the prosecution, the Examiner made the statement that a gas phase reaction must contain liquid. This statement is incorrect and is entirely inconsistent with the gas phase process in Gibson et al. At page 12, lines 18-20, Gibson et al. describe the gas phase process as being free from, or substantially free of liquid. At page 12, lines 18-25, Gibson et al. defines the gas phase process as the formation of a solid in a polymerization zone directly from a gas and free from liquid. There is no liquid phase reaction medium and no condensation of the gas phase in the gas phase process described in Gibson et al.

In the final rejection, the Examiner states that "Hinton discloses a polymerization process having a reactor containing a heat exchanger in the gas phase of the reactor . . ." The Examiner's description of Hinton et al. is incomplete. Hinton et al. teach a process for the polymerization of conjugated dienes. A heat exchanger is placed in the gas phase in order to condense the gas phase and thus cool the liquid reaction medium. The products of this reaction are conjugated diene polymers.

The Examiner does not provide any motivation for one of ordinary skill in the art to combine these two references and for this reason alone, the rejection is deficient since the Examiner must provide the appropriate motivation to combine the references. The Appellants assert that Gibson et al. and Hinton et al. may not be properly combined because there is no motivation for combining them. The two references disclose entirely different polymerization processes. The reaction mechanism described in Gibson et al. is entirely different from the reaction mechanism described in Hinton et al. since the former reference describes a reaction which takes place in the gas phase and the latter reference describes a reaction which takes place in the liquid phase. There is no reason provided in either of the references why one would make use of a reaction scheme used in the polymerization of conjugated dienes in a process for

oligomerizing ethylene. Furthermore, the use of and description of heat exchange in Gibson et al. in the gas phase is much different than the description of and the use of heat exchange described in Hinton et al. The references simply do not provide anything in their disclosures which would motivate one of ordinary skill in the art to combine them to come up with a process for the oligomerization of ethylene. Appellants request that the rejection of claims 1 and 3-7 be overturned.

The Rejection of Claim 2

This rejection must be based upon the same premise as the previous rejection because the Examiner does not provide any other explanation in the final rejection of June 13, 2005. For the reasons discussed above, the Appellants believe that they have provided sufficient basis for overturning the Examiner's rejection based on the combination of Gibson et al. and Hinton et al. Since Reagan discloses nothing material other than the use of a chromium or titanium catalyst for oligomerizing ethylene, the Appellants request that the rejection of claim 2 be overturned for the reasons discussed above in connection with Gibson et al. and Hinton et al.

Conclusion

The Appellants assert that the arguments presented above overcome the rejections of claims 1 and 3-7 and the rejection of claim 2.

Respectfully submitted,

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CLAIMS APPENDIX

1. A process for making a linear alpha-olefin oligomer in a reactor comprising a liquid and a gas phase, comprising the steps of catalytically oligomerizing ethylene in the presence of a complex selected from the group consisting of nickel, palladium, cobalt, titanium, zirconium, hafnium, vanadium, chromium, molybdenum, and tungsten complexes, to an alpha-olefin oligomer under release of heat, and removing the heat with a heat exchanger, which is positioned in the gas phase in the reactor but not in direct contact with the liquid phase, using at least part of the gas phase as a coolant medium.

2. The process of claim 1 wherein the complex is selected from the group consisting of nickel, titanium, zirconium, and chromium complexes.

3. The process of claim 1 wherein the alpha olefin oligomer has an average molecular weight between about 50 and about 350.

4. The process of claim 3 wherein the average molecular weight is between about 60 and about 280.

5. The process of claim 4 wherein the average molecular weight is between about 80 and about 210.

6. The process of claim 1 wherein the coolant medium is selected from the group consisting of an alkane, an inert heteroatom-containing group substituted alkane, an alkene, and an aromatic compound, and mixtures thereof.

7. The process of claim 1 wherein the coolant medium is selected from the group consisting of propane, n-pentane, isopentane, ethylene, 1-butene, o-, m-, and p-xylene, and toluene, and mixtures thereof.